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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/004,548	12/04/2001	Daniel D. M. Shearer III	2277-060	7193

7590 11/10/2005

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EXAMINER	
NGO, NGUYEN HOANG	
ART UNIT	**PAPER NUMBER**
2663	

DATE MAILED: 11/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/004,548	SHEARER, DANIEL D. M.	
	Examiner	Art Unit	
	Nguyen Ngo	2663	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-32 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) 29-32 is/are allowed.

6)☒ Claim(s) 1-4, 6-9, 12-18, 20-21, 23-25, 27, and 28 is/are rejected.

7)☒ Claim(s) 5,10,11,19,22 and 26 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The attempt to incorporate subject matter into this application by reference a "Forwarding Communication Network and Wireless Channel Allocation Method Therefor" is improper because applicant has failed to provide the U.S. Patent Application Serial Number or Patent Number.

2. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

Examiner believes that reference numbers pertaining to the invention should be taken out from the Abstract. Following corrections should be made throughout the Abstract, pertaining to reference numbers.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims 1,2, 3, 4, 6, 7, 8, 9, 12, 13, 14, 15, 16, 17, 18, 20, 21, 23, 24, 25, 27, and 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Choi (US 2002/0141375), in view of Amouris (US 2002/0001294), hereinafter referred to as Choi and Amouris.

Regarding claim 1, Choi discloses a system for providing concurrent transmission in a WLAN (a multihop and multi-channel wireless communication network). Choi further discloses from figure 1 of an infrastructure network that is providing access to other networks (page1 [0005]). The Access point which is shown to be connected to a LAN line which is connected to other networks such as the Internet (LAN line correlating to a parent network, AP of figure 1) and an wireless network where communication takes place between the wireless nodes and the AP (wireless communication network configured as a daughter network which is coupled to the parent network through the AP, page 1 [0005]). Choi further discloses;

that communication takes place between the wireless node and the AP which is shown to be coupled to other networks such as the internet from figure 1 (a hub access point (HAP) node configured to be coupled to said parent network (as shown in figure 1) and configured to engage in outward wireless communication (communication between wireless node and AP), page1 [0005]).

that the communication between a plurality of stations includes the steps pf broadcasting a signal message from the AP to the plurality of stations over a wireless communication channel, where the signal message comprises a plurality of assigned TDM time slots (a plurality of active nodes (stations) configured to engage in said outward wireless communication (broadcasting from AP to stations) with said HAP node over a plurality of outward communication paths (communication channel), page1 [0009]).

Choi is however silent with the specific limitations of having the communication path including at least two outward hops and uses at least two channels wherein the scheduled time slots are allocated to said active nodes, one time slot associated with each outward hop. Choi does however disclose the need to increase link capacity in a WLAN by efficiently utilizing the wireless link bandwidth by means of TDM time slots, thus providing the motivation to incorporate some type of time slot allocation mechanism to efficiently use bandwidth.

Amouris discloses a method for allocating a set of time slots belonging to a common TDMA channel to a network of transceivers nodes (abstract). Amouris further discloses, from figure 1, of a transmission range R where node n can be received only by the radios located within a circle 10 and that this circular area 10 is referred to node's n one-hop neighborhood (page 1 [0005]). Similarly circular area bounded by the circle 12 is defined as node n's two-hop neighborhood (communication paths each include at least two outward hops, page 1 [0006]) and further discloses that the transmission path incorporate different channels that will be used for the transmission of the communication from AP to the nodes, as seen in figure 5 (communication paths each include at least two channels (f), page6 [0102]). Amouris further discloses dividing the set of time slots into a plurality of time slot sub-sets; defining for each transceiver node a common function that assigns one time slot sub-set to each point in space, periodically identifying a set of space coordinates for a transceiver node and allocating to each transceiver node time slots belonging to the time slot sub-set assigned by the common function to the point in space (scheduled time slots are allocated to said active nodes (transceiver nodes) for transmitting data packets over said plurality of outward communication paths, one time slot is associated with each outward hop (outward hop correlating to a point in space, and said time slots are consecutively arranged along said plurality of outward communication paths, page 2 [0021]). The Examiner interprets the point in space association with a time slot to correlate to a hop association with a time slot. It would thus be obvious to a person skilled in the art to incorporate the method of assigning time slots defined by a nodes point in space (correlating to hops)

as defined by Amouris into the system for providing concurrent transmission in a WLAN as disclosed by Choi to efficiently utilize the wireless link bandwidth by means of TDM time slots and maximize the re-use of time slots, while guaranteeing that each node's broadcast transmission are successfully received.

Regarding claim 2, the combination of Choi and Amouris disclose all the limitations of claim 2, more specifically Amouris discloses that a given node in the network with current space coordinates (xi, yi), allocates itself a time slot belonging to a time slot set (page 6 [0092]). It would thus be obvious to have node n (correlating to the AP) to allocate itself a beginning time slot in the outward communication path for it is the first space coordinate (consecutive time slots are allocated to said active nodes in said outward communication paths beginning with a time slot allocated to said HAP (n node) node).

Regarding claim 3, the combination of Choi and Amouris disclose all the limitations of claim 3, more specifically Amouris discloses from figure 1 that all the nodes within the range R are considered on hop neighbors (page [0005]) which shows node n being a termini and the separate transceiver node being the other termini (each of said outward hopes has two termini (node n and transceiver termini), with one of said two termini being at one of said active nodes (transceiver node)).

Regarding claim 4, the combination of Choi and Amouris disclose all the limitations of claim 4, more specifically Choi discloses that the AP can determine which stations are hidden from each other (page 3 [0030]) and that in WLAN networks there exist hidden terminals (comprising at least one inactive node, page 1 [0008]). It would be obvious to a person skilled in the art to allocate an unscheduled time slot to said active node for use in communication with the hidden terminals (inactive nodes, provision of allocated time slot to support concurrent transmission (between inactive nodes and active nodes), page 2 [0023]).

Regarding claim 6, the combination of Choi and Amouris disclose all the limitations of claim 6, more specifically Amouris discloses that there is a need for a distributed, dynamic TDMA time slot allocation method, as described above, that overcomes the limitation of bandwidth efficiency, as the bandwidth efficiently drops exponentially as the maximum network degree vary (maximum nodes)(page 2 [0018]-[0020]). It is well known in the art that latency is the speed of a transmission in a network from a source node to a destination node. It should thus be obvious that the outward communication paths exist for a latency period as the communication path occurs when there is a transmission from a source (node n or AP) to a destination (transceiver node). Amouris further discloses that the described TDMA time slot allocation method overcomes the problem of bandwidth efficiency, correlating to reducing latency. As the bandwidth of a link is efficiently used, the capacity of the link is used more effectively (time slots) thus

reducing latency periods (time slots are allocated to minimize a total of said latency periods for all of said outward communication paths).

Regarding claim 7, the combination of Choi and Amouris disclose all the limitations of claim 7, more specifically Amouris discloses a method for allocating a set of time slots belonging to a TDMA channel to a network of transceiver nodes (each of said active nodes includes only one transceiver, said only one transceiver is configured to transmit or receive over a plurality of channels (TDMA channel comprising a plurality of channels (f of figure 5) and each of said active nodes both transmit and receive over at least one of said plurality of channels, page2 [0021]).

Regarding claim 8, the combination of Choi and Amouris disclose all the limitations of claim 8 as discussed with claim 1. It should be obvious that the limitations of inward communication paths as disclosed by claim 8, with two inward hops be similar to the outward communication paths with two outward hops as disclosed by claim 1. The allocation of time slots for an outward hop can be implemented the same way as an allocation for a time slot for an inward hop. It should be obvious that if a WLAN network have an outbound transmission, it will also have an inbound transmission to transfer data between the nodes and the AP.

Regarding claim 9, the combination of Choi and Amouris disclose all the limitations of claim 9 as discussed with claim 2. It would be obvious to a person skilled in the art to

have consecutive time slots allocated to said active nodes in said inward communication paths beginning with outermost active nodes for said inward communication paths due to the space coordinates. Time slots are allocated depending on space coordinates as disclosed by Amouris, thus it would be obvious to begin allocation of time slots with the outermost active nodes as this is the beginning of an inward communication transmission.

Regarding claim 12, the combination of Choi and Amouris disclose all the limitations of claim 12, more specifically Choi discloses that IEEE 802.11 Wireless LAN standard be used (HAP node and active nodes are operated in accordance with an IEEE 802.11 standard, page 2 [0026]).

Regarding claim 13, the combination of Choi and Amouris disclose all the limitations of claim 13, more specifically Amouris discloses that the plurality of nodes be transceivers, which is well known in the art to receive and transmit (a portion of said active nodes forwards (transmit) data packets toward outermost active nodes and said portion of said active nodes receives). Amouris further discloses transmitting over different channels represented by f (transmits packets over different channels, page 5 [0075]).

Regarding claim 14, Choi discloses a system for providing concurrent transmission in a WLAN (a multihop and multi-channel wireless communication network). Choi further discloses from figure 1 of an infrastructure network that is providing access to other

networks (page1 [0005]). The Access point which is shown to be connected to a LAN line which is connected to other networks such as the Internet (LAN line correlating to a parent network, AP of figure 1) and an wireless network where communication takes place between the wireless nodes and the AP (wireless communication network configured as a daughter network which is coupled to the parent network through the AP, page 1 [0005]). Choi further discloses;

that communication takes place between the wireless node and the AP which is shown to be coupled to other networks such as the internet from figure 1 (a hub access point (HAP) node configured to be coupled to said parent network (as shown in figure 1) and configured to engage in inward wireless communication (communication between wireless node and AP), page1 [0005]).

that the communication between a plurality of stations includes the steps pf broadcasting a signal message from the AP to the plurality of stations over a wireless communication channel, where the signal message comprises a plurality of assigned TDM time slots (a plurality of active nodes (stations) configured to engage in said outward wireless communication (broadcasting from AP to stations) with said HAP node over a plurality of outward communication paths (communication channel), page1 [0009]). It would further be obvious to provide inward communication paths from the stations to the AP similar to the steps in the outward communication paths as it is well known in the art that a system may have an outward communication path that perform the same steps as an inward communication path by is reversed.

Choi is however silent with the specific limitations of having the communication path including at least two inward hops and uses at least two channels wherein the scheduled time slots are allocated to said active nodes, one time slot associated with each inward hop. Choi does however disclose the need to increase link capacity in a WLAN by efficiently utilizing the wireless link bandwidth by means of TDM time slots, thus providing the motivation to incorporate some type of time slot allocation mechanism to efficiently use bandwidth.

Amouris discloses a method for allocating a set of time slots belonging to a common TDMA channel to a network of transceivers nodes (abstract). Amouris further discloses, from figure 1, of a transmission range R where node n can be received only by the radios located within a circle 10 and that this circular area 10 is referred to node's n one-hop neighborhood (page 1 [0005]). Similarly circular area bounded by the circle 12 is defined as node n's two-hop neighborhood (communication paths each include at least two inward hops, page 1 [0006]) and further discloses that the transmission path incorporate different channels that will be used for the transmission of the communication from AP to the nodes, as seen in figure 5 (communication paths each include at least two channels (f), page6 [0102]). Amouris further discloses dividing the set of time slots into a plurality of time slot sub-sets; defining for each transceiver node a common function that assigns one time slot sub-set to each point in space, periodically identifying a set of space coordinates for a transceiver node and allocating to each transceiver node time slots belonging to the time slot sub-set assigned by the

common function to the point in space (scheduled time slots are allocated to said active nodes (transceiver nodes) for transmitting data packets over said plurality of inward communication paths, one time slot is associated with each inward hop (inward hop correlating to a point in space, and said time slots are consecutively arranged along said plurality of inward communication paths, page 2 [0021]). The Examiner interprets the point in space association with a time slot to correlate to a hop association with a time slot. It would thus be obvious to a person skilled in the art to incorporate the method of assigning time slots defined by a nodes point in space (correlating to hops) as defined by Amouris into the system for providing concurrent transmission in a WLAN as disclosed by Choi to efficiently utilize the wireless link bandwidth by means of TDM time slots and maximize the re-use of time slots, while guaranteeing that each node's broadcast transmission are successfully received.

Regarding claim 15, the combination of Choi and Amouris disclose all the limitations of claim 15 as discussed with claim 2. It should be obvious that if a WLAN network have an outbound transmission, it will also have an inbound transmission to transfer data between the nodes and the AP, with similar methods for allocation of time slots.

Regarding claim 16, the combination of Choi and Amouris disclose all the limitations of claim 16 as discussed with claim 6.

Regarding claim 17, the combination of Choi and Amouris disclose all the limitations of claim 17 as discussed with claim 13.

Regarding claim 18, Choi discloses a system for providing concurrent transmission in a WLAN. Choi further of an Access point which is shown to be connected to a LAN line which is connected to other networks such as the Internet (AP of figure 1) and an wireless network where communication takes place between the wireless nodes and the AP (hub access-point (HAP) node communicates with a plurality of active nodes (wireless nodes), page 1 [0005]). Choi further discloses;

that the communication between a plurality of stations includes the steps pf broadcasting a signal message from the AP to the plurality of stations over a wireless communication channel, where the signal message comprises a plurality of assigned TDM time slots (sending allocation data to said active nodes, said allocation data identifying assignments of said time slots to said active nodes, page1 [0009]).

Choi is however silent with the specific limitations of having the communication path including at least two hops and uses at least two channels wherein assigning time slots to said active nodes so that one time slot is associated with each hop. Choi does however disclose the need to increase link capacity in a WLAN be efficiently utilizing the wireless link bandwidth by means of TDM time slots, thus providing the motivation to incorporate some type of time slot allocation mechanism to efficiently use bandwidth.

Amouris discloses a method for allocating a set of time slots belonging to a common TDMA channel to a network of transceivers nodes (abstract). Amouris further discloses, from figure 1, of a transmission range R where node n can be received only by the radios located within a circle 10 and that this circular area 10 is referred to node's n one-hop neighborhood (page 1 [0005]). Similarly circular area bounded by the circle 12 is defined as node n's two-hop neighborhood (communication paths each include at least two hops, page 1 [0006]) and further discloses that the transmission path incorporate different channels that will be used for the transmission of the communication from AP to the nodes, as seen in figure 5 (communication paths each include at least two channels (f), page6 [0102]). Amouris further discloses;

dividing the set of time slots into a plurality of time slot sub-sets; defining for each transceiver node a common function that assigns one time slot sub-set to each point in space, periodically identifying a set of space coordinates for a transceiver node and allocating to each transceiver node time slots belonging to the time slot sub-set assigned by the common function to the point in space (collecting identity data (point in space) which describes every hop of each communication path, page 2 [0021]). Amouris further discloses of defining for each node a two-dimensional function S(x,y) that assigns an integer to each point (node) in two-dimensional space. The integer assigned to each point (x,y) represents one of the time slot sets L and therefore for any given node, function S(x,y) assigns a time slot set to that node (page3 [0039]). The Examiner interprets this to correlate to associating common first hops together in first-hop sets (all functions S(x,y) assigning an integer value for all the nodes bounded by

circular area 10 of figure 1 representing a one hop neighborhood), and within each of said first hop sets, ones of said communication paths having common second hops together to form second-hop sets (all functions S(x,y) assigning an integer value for all the nodes bounded by circular area 12 of figure 1 representing a two-hop neighborhood)). Amouris further discloses allocating to each one of the transceiver nodes time slots belonging to the time slot sub-set assigned by the function to the point in space identified by the periodically identified set of space coordinates (assigning time slots to said active nodes so that one time slot is associated with each hop, and said time slots are consecutively arranged along said communication paths).

It would thus be obvious to a person skilled in the art to incorporate the method of assigning time slots defined by a nodes point in space (correlating to hops) as defined by Amouris into the system for providing concurrent transmission in a WLAN as disclosed by Choi to efficiently utilize the wireless link bandwidth by means of TDM time slots and maximize the re-use of time slots, while guaranteeing that each node's broadcast transmission are successfully received.

Regarding claim 20, the combination of Choi and Amouris disclose all the limitations of claim 20 as discussed with claim 6, more specifically Amouris discloses that there is a need for a distributed, dynamic TDMA time slot allocation method, as described above, that overcomes the limitation of bandwidth efficiency, as the bandwidth efficiently drops

exponentially as the maximum network degree vary (maximum nodes)(page 2 [0018]-[0020]). It is well known in the art that latency is the speed of a transmission in a network from a source node to a destination node. It should thus be obvious that the communication paths exist for a latency period as the communication path occurs when there is a transmission from a source (node n or AP) to a destination (transceiver node). Amouris further discloses that the described TDMA time slot allocation method overcomes the problem of bandwidth efficiency, correlating to reducing latency. As the bandwidth of a link is efficiently used, the capacity of the link is used more effectively (time slots) thus reducing latency periods (time slots are allocated to minimize a total of said latency periods for all of said communication paths).

Regarding claim 21, the combination of Choi and Amouris disclose all the limitations of claim 21, more specifically Choi discloses that the Access Point (AP) updates the current interference level association of each active station with other stations (detecting occurrences of interfering ones (stations) of said communication paths, page 3 [0029]) and further discloses that if all the permissible parameters are satisfied (including interference levels, figure 7), then the AP will allocate time slots for current transmissions (adding time slots at said occurrences of said interfering ones of said communication paths, page 4 [0037]).

Regarding claim 23, the combination of Choi and Amouris disclose all the limitations of claim 23 as discussed with claim 4, more specifically Choi discloses that the AP can

determine which stations are hidden from each other (page 3 [0030]) and that in WLAN networks there exist hidden terminals (comprising at least one inactive node, page 1 [0008]). It would be obvious to a person skilled in the art to allocate an unscheduled time slot to said active node for use in communication with the hidden terminals (inactive nodes, provision of allocated time slot to support concurrent transmission (between inactive nodes and active nodes), page 2 [0023]).

Regarding claim 24, the combination of Choi and Amouris disclose all the limitations of claim 23 as discussed with claim 8, It should be obvious that communications paths both include inward communication paths over which data flows from said active nodes toward said HAP node and outward communication paths over which data flows from said HAP node towards said active nodes, as this is well known in the art. Communications between the transceiver nodes and node n (AP node) must include inward and outward communications, as this is the only way to communicate between nodes. The allocation of time slots for an outward hop can be implemented the same way as an allocation for a time slot for an inward hop. It should be obvious that if a WLAN network have an outbound transmission, it will also have an inbound transmission to transfer data between the nodes and the AP. Time slots are allocated depending on space coordinates as disclosed by Amouris, thus it would be obvious to begin allocation of time slots with the outermost active nodes as this is the beginning of an inward communication transmission with similar reasoning for outward communications (assigns consecutive time slots to said active nodes in said inward

communications paths beginning with outermost nodes (dependent on the space coordinates) in said inward communication paths).

Regarding claim 25, Choi discloses a system for providing concurrent transmission in a WLAN (a multihop and multi-channel wireless communication network). Choi further discloses from figure 1 of an infrastructure network that is providing access to other networks (page1 [0005]). The Access point which is shown to be connected to a LAN line which is connected to other networks such as the Internet (LAN line correlating to a parent network, AP of figure 1) and an wireless network where communication takes place between the wireless nodes and the AP (wireless communication network configured as a daughter network which is coupled to the parent network through the AP, page 1 [0005]). Choi further discloses;

that communication takes place between the wireless node and the AP which is shown to be coupled to other networks such as the internet from figure 1 (a hub access point (HAP) node configured to be coupled to said parent network (as shown in figure 1) and configured to engage in outward and inward wireless communication (communication between wireless node and AP), page1 [0005]).

that the communication between a plurality of stations includes the steps pf broadcasting a signal message from the AP to the plurality of stations over a wireless communication channel, where the signal message comprises a plurality of assigned TDM time slots (a plurality of active nodes (stations) configured to engage in said outward wireless communication (broadcasting from AP to stations) with said HAP node

over a plurality of outward communication paths (communication channel), page1 [0009]). It would further be obvious to provide inward communication paths from the stations to the AP similar to the steps in the outward communication paths as it is well known in the art that a system may have an outward communication path that perform the same steps as an inward communication path but is reversed.

Choi is however silent with the specific limitations of having the communication path including at least two hops and uses at least two channels wherein the scheduled time slots are allocated to said active nodes, one time slot associated with each hop. Choi does however disclose the need to increase link capacity in a WLAN by efficiently utilizing the wireless link bandwidth by means of TDM time slots, thus providing the motivation to incorporate some type of time slot allocation mechanism to efficiently use bandwidth.

Amouris discloses a method for allocating a set of time slots belonging to a common TDMA channel to a network of transceivers nodes (abstract). Amouris further discloses, from figure 1, of a transmission range R where node n can be received only by the radios located within a circle 10 and that this circular area 10 is referred to node's n one-hop neighborhood (page 1 [0005]). Similarly circular area bounded by the circle 12 is defined as node n's two-hop neighborhood (communication paths each include at least two hops, page 1 [0006]) and further discloses that the transmission path incorporate different channels that will be used for the transmission of the

communication from AP to the nodes, as seen in figure 5 (communication paths each include at least two channels (f), page6 [0102]). Amouris further discloses dividing the set of time slots into a plurality of time slot sub-sets; defining for each transceiver node a common function that assigns one time slot sub-set to each point in space, periodically identifying a set of space coordinates for a transceiver node and allocating to each transceiver node time slots belonging to the time slot sub-set assigned by the common function to the point in space (scheduled time slots are allocated to said active nodes (transceiver nodes) for transmitting data packets over said plurality of inward and outward communication paths, one time slot is associated with each hop (inward and outward hop correlating to a point in space, and said time slots are consecutively arranged along said plurality of inward communication paths, page 2 [0021]). The Examiner interprets the point in space association with a time slot to correlate to a hop association with a time slot. Amours further discloses that time slots are allocated depending on space coordinates, thus it would be obvious to begin allocation of time slots with the outermost active nodes as this is the beginning of an inward communication transmission with similar reasoning for outward communications (first portion of said time slots is consecutively arranged along said plurality of outward communication paths beginning with said HAP node, and a second portion of said time slots is consecutively arranged along said plurality of inward communication oaths beginning with outermost ones of said active nodes in said inward communication paths). It would thus be obvious to a person skilled in the art to incorporate the method of assigning time slots defined by a nodes point in space (correlating to hops) as

defined by Amouris into the system for providing concurrent transmission in a WLAN as disclosed by Choi to efficiently utilize the wireless link bandwidth by means of TDM time slots and maximize the re-use of time slots, while guaranteeing that each node's broadcast transmission are successfully received.

Regarding claim 27, the combination of Choi and Amouris disclose all the limitations of claim 27 as discussed with claim 16 and 6.

Regarding claim 28, the combination of Choi and Amouris disclose all the limitations of claim 28 as discussed with claim 7.

Allowable Subject Matter

6. Claims 5, 10, 11, 19, 22, 26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

7. Claims 29-32 are allowed.

8. Claims 29 is allowable over the prior art of record since the cited references taken individually or in combination fail to particularly disclose **communication paths having common first hops which are associated together in first-hop sets, and within each of said first-hop sets, said paths have common second hops which**

<u>are associated together to form second-hop sets and the limitations to interleave said first-hop sets and said second-hop sets.</u> It is noted that the closest prior art Choi (US 2002/0141375) shows a system and method for providing concurrent transmission in a WLAN in which the WLAN includes a plurality of stations for transmitting information via an assigned TDM time slot and an access point in communication with the nodes for providing time allocation to allow data exchange. However the stated prior art fails to disclose or render obvious to the above underline limitations as claimed.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a) Stevens et al. (US 5949760), Simultaneous Channel Access Transmission Method For Multi-Hop Communication Radio Network.

b) Young (US 6711177), Method And Apparatus For Managing Communication Resource Using Frame Fitting.

c) Personick (US 2002/0191588), Integrated Circuit and Packet Switching System

d) Belcea (US 6807165), Time Division Protocol For An Ad-Hoc, Peer-to-Peer Radio Network Having Coordinate Channel Access To Shared Parallel Data Channels With Separate Reservation Channel.

e) Haartsen (US 6393007), Method Of And A System For Voice And Data Radio Communication Providing Improved Interference Diversity.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nguyen Ngo whose telephone number is (571) 272-8398. The examiner can normally be reached on Monday-Friday 7am - 3:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ricky Ngo can be reached on (571) 272-3139. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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